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ABSTRACT

Technology education in Taiwan begins with craft work at the elementary school level, and the most important point is the practical application. All junior high school students are required to take the Living Technology course. Content includes technology and life, information and communication, construction and manufacturing, and energy and transportation. The technology education curriculum in senior high school is Living Technology. Its content is the same as that for junior high school. Issues to be resolved in the new senior-high-school technology education curriculum are: that these courses are not articulated with college-entry requirements; that creating a realistic learning environment for these courses is not well supported; and that challenges resulting from the new curriculum (such as teacher training and upgrading textbooks) need to be addressed. Technology education programs are not institutionalized in elementary teachers' colleges. Taiwan has a complete and formal system to train Living Technology teachers. Special features are fitting the educational reform trend and transforming teacher education policy into an open public vision; teacher education in a changing and adaptive stage; and traditional normal education system in transformation. Challenges in technology teacher education are the new teacher education system vs. old educational environment and the urgency of improving the inservice training system. (Alternating pages are in English and Chinese.) (YLB)

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中華民國科技教育及其師資教育

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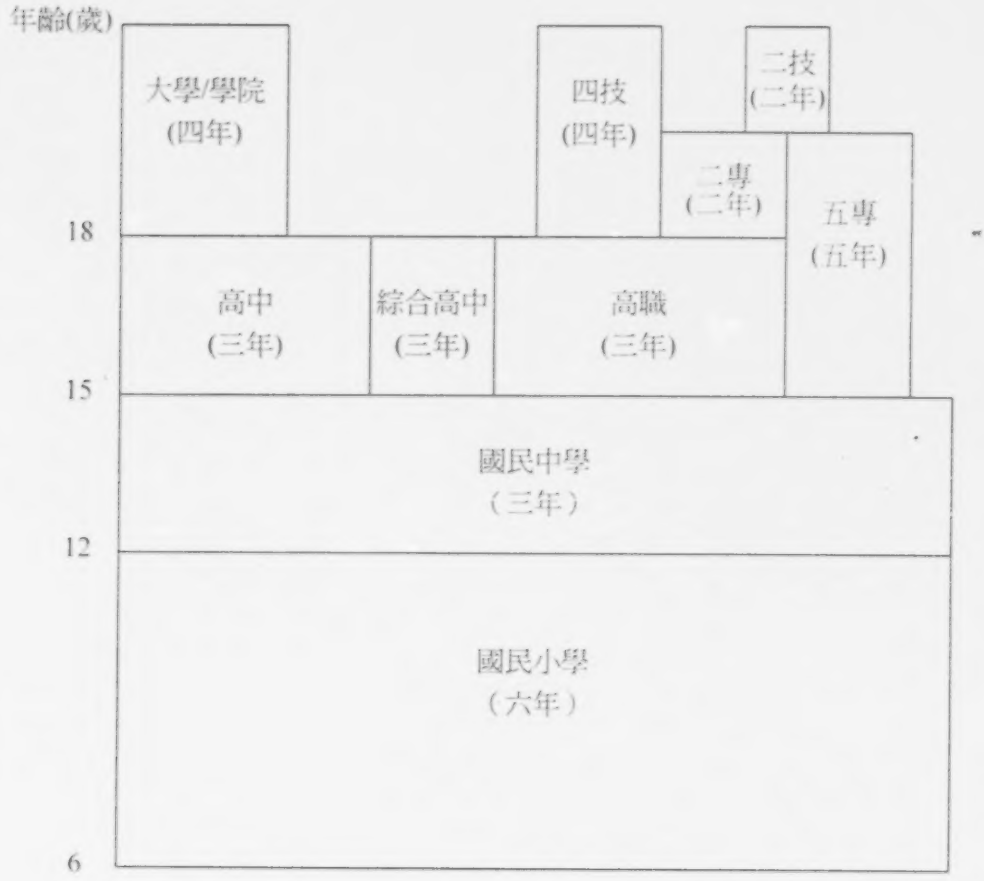
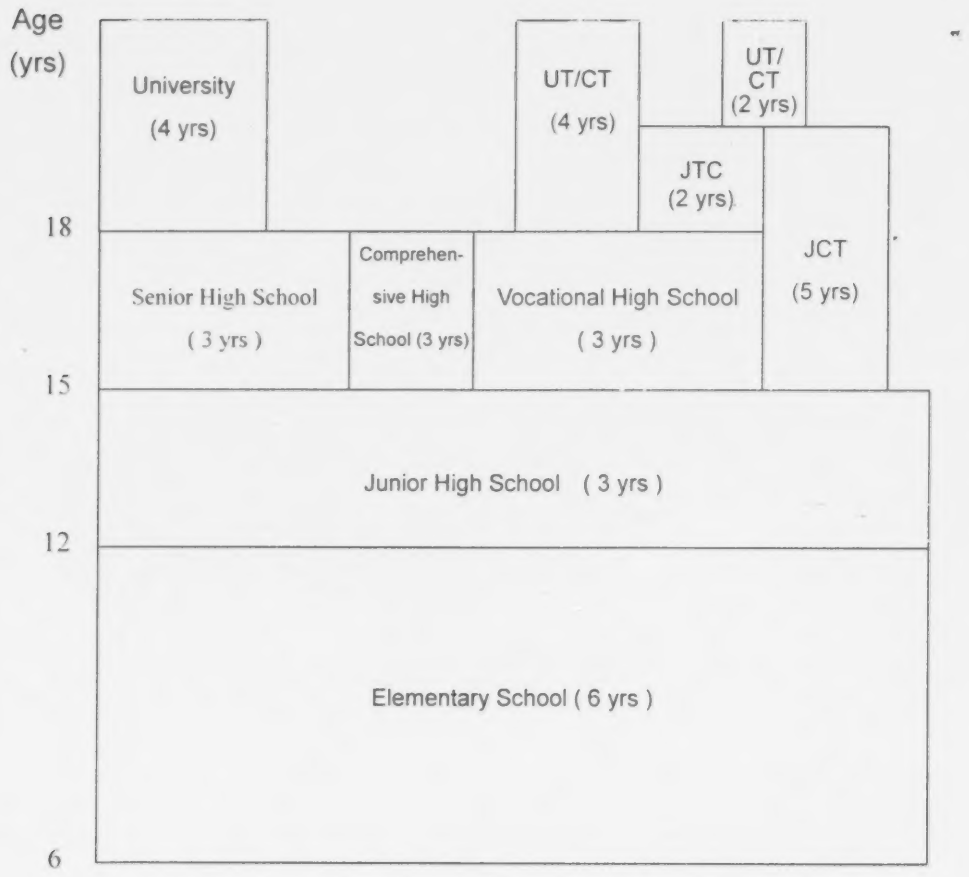
中華民國科技教育及其師資教育

中華民國在台灣(以下簡稱「台灣」)的學制如圖示。本簡介介紹國小、國中和高中普通教育中的科技教育(technology education)，及其師資教育現況與展望。



Technology Education and Technology Teacher Education in Taiwan, R. O. C.

The purpose of this introduction is to state the current situation and future outlook of technology education and technology teacher education in Taiwan. The current school system of Taiwan, R.O.C. is charted below.



Note
JCT: Junior College of Technology
UT/CT: University of Technology / College of Technology
Yrs: Years

壹、科技教育

一、 國小階段

台灣 0-6 歲的幼兒教育尚未納入正式學制，所以是非強迫性的學前教育；但事實上大部份學童在就讀國小前，會就讀托兒所和(或)幼稚園。目前托兒所和幼稚園並無國定課程，因此科技之學習沒有統一的規定。但由於學前教育兼重保育與教育，通常採大單元的方案教學。生活之中常見的科技（如常用工具、交通載具）常被納入課程與教學。

國小現行課程主要分爲：國語、數學、自然、社會、美勞、音樂、體育等科目。「生活科技」是「美勞」的一部份。但是除了美勞以外，在其他學科中仍可見到生活科技的教學，例如自然科教導學生使用工具，設計與製作科學玩具。

「美勞」分爲表現、審美和生活實踐三大領域，低中年級（1-4 年級）的教材對等重視心像與機能表現，高年級（5-6 年級）加重機能表現。生活科技在美勞課中，側重於生活的實踐。其教材主要內容有：選用玩具、衣物、飾品等日常用品，布置空間，應用科技媒材，使用基本工具等。在教學實務上以知覺統合、創意解題等都是常見的主張。

教育部從 1997 年起著手國民中小學九年一貫課程綱要的研訂，以呼應教育改革的訴求。第一學習階段（1-3 年級）暫行綱要已在 2000 年 3 月公告，並決定自 2001 年 8 月起由國小一年級開始實施。在新課程中，國小一、二年級以「自然與生活科技」、「社會」及「藝術與人文」三個學習領域統合爲「生活」學習領域，至少編配有 11 節「生活科技」。國小三、四年級階段，至少編配有 11 節「生活科技」在「自然與生活科技」領域中。國小五、六年級階段，至少編配有 40 節「生活科技」，以一學期每週二節或一學年每週一節的分科方式實施。

Technology Education

Elementary School Level

Constrained by limited financial resources, the government has not included preschool children in the compulsory education presently in Taiwan. However, most of the children do have the experience of nursery school and/or kindergarten by voluntary enrollment before beginning to elementary schools at the age of six. Although there is no national standard for the preschool curriculum, the program is designed to keep children healthy, both physically and mentally, and usually uses thematic instruction as the main teaching method. Theme of technology in daily life can easily be found in the programs or learning activities such as tools and vehicles.

The entire elementary school curriculum consists of the following disciplines: language, mathematics, natural science, social science, craftwork, music, and physical education. Craftwork includes living technology. In addition to craftwork, technology learning can sometime also be found in other subjects such as natural science.

The goals of craftwork are set to enhance the children's ability of presentation, appreciation, and practical application. At the level of grades 1-4, it emphasizes intelligent image and functional presentation, and further emphasizing on functional presentation at the level of grades 5-6. Thus, in the area of craftwork, the most important point of technology education is the practical application. Instructional materials like choosing toys/clothes/ornaments, applying technological materials, using tools, etc., are common and the demands for synthesis of perception, and creative problem-solving are also prevalent.

在可見的未來中，生活科技將在「自然與生活科技」學習領域中，和「自然」採統合學科的方式分立並行但相互聯繫的方式存在，但是，其有關課程、教材和教法尚待發展。

The Ministry of Education (MOE) began the amendment of the national curriculum syllabus for grades 1-9 from 1997, which reflects the call for educational reform. The first stage of the syllabus for grades 1-3 was proclaimed in March 2000, and will to be implemented in 2001. According to this new curriculum syllabus, Natural Science & Living Technology, Social Studies and Arts & Humanities are integrated into the learning area named "Living" for 1st and 2nd grades students, Living Technology should be taught no less than 11 teaching hours. The syllabus recommends that 3rd and 4th grades students have at least 11 teaching hours of living technology lessons, and no less than 40 teaching hours for 5th-6th grades. The class should be taught for 2 class hours every week for one semester, or 1 class hour every week for two semesters.

In the visible future, the subject Living Technology will coexist with Natural Science in the learning area of Nature Science & Living Technology, and will be taught independently, but having contact with each other. The programs, teaching materials, and instructional strategies need to be highly developed.

二、 國中階段

國中現行「家政與生活科技」課程，係由先前的「家政」與「工藝」課程合併調整而來，並正式於 1997 年公佈實施。該年國中「工藝」課程除了正式改名爲「生活科技」外，更規定男女學生皆必修，課程內容也由以材料加工職類爲主的「工藝」導向課程，改爲以科技範疇爲導向的課程設計，內容包括科技與生活、資訊與傳播、營建與製造、能源與運輸四大部分。實施方式爲每學年各擇一學期教授「家政」或「生活科技」，該學期中每週排課兩節，總時數約爲 108 小時。

根據國定課程標準，「生活科技」旨在培養學生日常生活所需科技素養。目前全國各地區國中課程實施已經完全由「工藝」轉爲「生活科技」，多數教師均認爲新的課程能充分反應台灣社會的生活環境，學生也較能學到符合生活所需的內涵。教育改革的呼籲，及整體教育環境的改善，如師資培育多元化、入學管道多元、中小學電腦普及等具體措施的影響，使得國中「生活科技」受到較以往更多的重視。雖然生活科技由早期的「勞作」、「手工藝」、「工藝」調整而來，仍有部份教師或因進修不足、或對於「工藝」的偏好，對於新科技課程內涵的瞭解不一而足，因此仍有部份教師依其個人背景與好惡篩選課程內容，或沿用舊的「工藝」教材內容與教法。不過，一些吸收快、學習能力較佳、工作較爲熱衷的科技教師，甚至彼此支援，建立網站，分享其教學心得與經驗。

Junior High School Level

The incorporation of the curriculum of Home Economics and Industrial Arts in junior high schools was planned in 1990's, and the new course "Home Economics and Living Technology" took into effort in 1997. The name "Living Technology" is used to repiace "industrial Arts", which is industrial-oriented, to emphasize its technology-oriented nature. All students, regardless of gender, are required to take the course. The content of Living Technology includes Technology and Life, Information and Communication, Construction and Manufacturing, and Energy and Transportation. The total hours of the three-year course Living Technology are about 108 hours, being taught two hours a week for one semester per academic year.

According to the national curriculum standards, the course Living Technology aims to provide the students the technological literacy that is necessary for daily life. Now, Living Technology has completely substituted Industrial Arts in Taiwan. Most Living Technology teachers feel the new curriculum provides more useful content and reflects the living environment of Taiwan society more thoroughly. Thanks to the calls of educational reform and the government's policy for various ways of entering upper-secondary schools and the wide use of computers in elementary and secondary schools, Living Technology has gained more attention than in the past. However, some teachers do not understand the content of the new curriculum sufficiently and prefer using traditional teaching instruction and content used in Industrial Arts to teach Living Technology. Fortunately, more and more diligent teachers who digest new knowledge fast and have a better ability of learning to write web pages to share their experience with others.

目前正進行研修與試辦中小學九年一貫課程，「生活科技」與「自然」並列爲七大學習領域之一。由於促使台灣成爲二十一世紀科技島的願景已經是全國人民的共識，加上環境保護意識的覺醒，民主社會公民參與公共科技決策（如核能）的權力與義務於台灣社會逐漸成熟，未來全民勢必要具備更爲完備的科技素養，因此可以預見的是全民科技課程在台灣既應該也勢必受到更多的重視。

Currently, the national curricula of elementary and junior high schools (grades 1-9) are under revision and field-testing. Living Technology, coordinated with Nature Science, is one of the so-called seven key learning areas (KLA's). As we can see, it is society's common vision to make Taiwan a technological island. Besides, more and more people are aware that they should protect the environment. Furthermore, like people in other democratic societies, Taiwanese citizens have the rights and obligations to take part in the decision of public policies. We can foresee that technology courses will receive more and more attention as Taiwanese people realize the need of adequate technological literacy to adapt to this new life.

三、 高中階段

高中課程標準約略十年修訂，高中生活科技的舊課程名稱是「工藝」，而新的課程於 1999 年起實施，目標在：理解科技及評估其對個人社會環境及人類文明的影響、發展善用科技知能解決問題及研習科技的能力與培養正確的科技觀念和態度，並啓發對科技研發的興趣。

其課程實施內容，透過科技與生活、資訊與傳播、營建與製造、能源與動力四個和國中相同的領域，深入探討科技及其所衍生之問題，在活動中製作專題，建造產品或模型，並評鑑以上過程對人類生活、社會、文化、環境的影響。其實施方式，則規劃在科技教室實施，以解決問題爲中心，實際生活體驗爲導向，著重實作與動腦並用，並在活動過程中評量學生之學習成就。

在高中階段，所有高二、高三學生都必須修習每週二小時的家政/生活科技課程，生活科技的總授課時數約爲 72 小時。

現階段高中生活科技課程在實施上，遭遇下列問題：

(一)升學主義影響教學正常化

一般而言，高中是一個階段性的教育，其主要目標爲繼續升學。然而，因爲大學校院入學考試，並不包括「生活科技」及其他藝能類、體育類科目。因此，這些科目均被視爲「副科」(較不重要的科目)，此一根深蒂固的傳統，嚴重影響生活科技教學的正常化。

Senior High School Level

On average, the revision cycle of the senior-high-school curriculum standard in Taiwan was 10 years or so. The technology education curriculum in senior high school was named Industrial Arts. The new version of technology education curriculum was implemented in 1999. To fit the kernel concept of the new curriculum standard, its name was changed to "Living Technology". To understand technology and evaluate its impact on individual/social environment and human civilization, to pursue the well-developed technological capabilities and problem-solving competence, to establish proper technological attitude and enlighten the interest on technology and study, are the goals of the living technology curriculum.

Technology and living, information and communication, construction and manufacturing, and energy and power, are the four major domains, same as those at the junior high school level, in the new technology education curriculum. There are some special features in this new curriculum. In the knowledge context, it emphasizes the fundamental literacy of modern technologies and their influences in a deep and complete view. In the teaching and learning activity, project-oriented is the important concept in the new curriculum. From the technological society view, it also focuses on the impact of technology application such as human life and its influences on society, culture and environment. In the implementation method of the living technology course, the major learning activities suggested implementation in a technology laboratory. Centering on problem resolving, experiencing real-world life issues, equally emphasizing hands-on and mind-on activities and stressing the importance of the authentic assessment in the learning processes, are its special features.

(二)教學環境與設備配合問題

生活科技課程與其他一般課程比較，較需複雜、昂貴的教學設施，也更需要其他資源的充分配合，這些措施需要政策、經費和觀念的配合。

(三)新課程引發新的問題與挑戰

更加寬廣的生活科技課程，需要學校與教師以全新的理念運作，才能落實課程的理想，然而其引發的新問題，亦需立即解決，例如：教師能力與在職進修、教科書更新與環境設備充實，都是需要立即解決的挑戰。

At the senior high school level, all the 10th and 11th grade students are required to take Home Economics and Living Technology courses. In these two years, the total amount of teaching time is about 72 hours

From the reflective view, there are some issues in the new senior-high-school technology education curriculum that need to be resolved:

1. Further-study generated teaching abnormal phenomenon

In general, the senior high school takes a preparative role in our educational system. The major goal in senior high school is pursuing a higher education opportunity of the college or university level. However, living technology and other artistic as well as physical education courses are not included in the subjects on the university/college entrance examination. These courses always play less important roles in school. In our traditional culture, people mocked these courses as auxiliary courses. This deep-rooted problem adversely influences our educational development. Teaching abnormal phenomenon of those auxiliary courses is a problem in senior high school.

2. Inharmoniousness phenomenon between the curriculum standard and realistic learning environment

In comparison with other general courses, living technology needs a more complicated and expensive teaching facility. It also requires a more intricate learning support system in the realistic teaching environment. However, due to the traditional culture impact, many negative factors such as policy, budget and thinking, prevent a harmonious development between the curriculum standard and the realistic teaching environment.

3. New curriculum leads new problems and challenges

From the content scope view, compared with the previous industrial arts curriculum, the new curriculum has a much broader scope. Educational reform leads innovation thinking into the new curriculum standard, and needs many practical strategies to be implemented. Many issues demand immediate attention and resolving, such as competence improvement of teachers and in-service training problems, learning environment updating and textbook upgrading problems.

貳、科技師資教育

一、中小學教師資格要求及其檢定制度

目前培育中等階段師資的機構主要爲台灣師範大學、彰化師範大學和高雄師範大學等三所大學。除此以外，一般公私立大學亦可依照「大學校院教育學程師資及設立標準」申請設置教育學程而成爲師資培育機構，至 1999 學年度，設立中等教育學程的大學校院有 38 所學校。培育小學階段師資的機構則以九所公立師範學院爲主，此外設置有小學教育學程的大學校院有十所。

中小學教師資格要求與檢定主要的法源依據是「師資培育法」。目前規定修畢大學校院各系所課程及教育學程者，可取得「初檢」資格而成爲「實習教師」；取得實習教師資格者，應經教育實習一年，成績及格，並經教師資格「複檢」合格者，才正式取得「合格教師」資格。合格教師可透過各中小學的教師甄選或經公費生分發，取得教職。

中等學校師資教育學程共計 26 學分，包括：（1）必修科目 12 學分；分爲教育基礎課程、教育方法學課程、教育實習課程、共三個領域。（2）選修科目 14 學分；由各校依其師資及發展特色自行開設。

小學師資教育學程共計 40 學分，包括：（1）必修科目；計 20 學分，其中可再細分爲教學基本學科課程、教育基礎課程、教育方法學課程、教育實習課程、共四個領域。（2）選修科目計 20 學分，由各校依其師資及發展特色自行開設。

Technology Teacher Education

Credentials and Certification System of the Elementary and Secondary High School

Most teachers in junior and senior high schools are graduates of National Taiwan Normal University, National Changhua University of Education, and National Kaoshiung Normal University. However, any university in Taiwan can offer a teacher education program if the university applies for it and passes the evaluation of the qualifications. At present, there are 38 qualified universities in Taiwan. Teachers in elementary schools are almost all graduates of 9 public teachers' colleges, there are also more than 10 qualified universities with programs for elementary teacher.

The system of teacher licensing in Taiwan is based on the "Teacher Preparation Act". Those who graduate from university/college and complete the teacher education program are qualified to become student teachers. They might receive the teacher license after passing the assessment of the one-year student teaching. Only licensed teachers can be formally employed by schools.

There are 26 semester credits in the teacher education program for secondary schools and 40 semester credits for elementary schools. The pedagogical courses in the programs are composed of 3-4 educational areas as fundamental, methodology and practical teaching.

二、國小教師及其養成和進修

在師資培育的現況方面，幼稚園教師是由師範學院幼兒教育系專責培育；由於幼教師資並無學科專長之區分，因此並沒有特定必修的科技教育課程。小學教師則主要由師範學院各學系培育；爲了因應小學以「包班制」爲主的實務需求，所以在師資養成的過程中，這些準教師除了須修畢其歸屬系別的必修與選修課程之外，還必須全面修習通盤性的課程（例如：美勞科教材教法、鍵盤樂、兒童文學等），以充實未來實際教學所需知能。

由於通盤必修的課程規劃係以現行小學課程爲主，「科技」課程尚未在小學以獨立學科方式實施，因此在師範學院尚無獨立的科技師資教育學程。雖然如此，在各師範學院美勞教育學系中，通常聘有專長工業教育或科技教育的師資，因而能在美勞相關必修與選修課程中會融入科技教育，學生若修習這些課程將能得到科技教育機會。另外，目前已經開辦小學師資教育學程的一般綜合大學亦能培育合格的小學師資，然而在課程規劃與實施方面大多依根據教育部小學教師檢定法規來開設教育學分，鮮少聘用科技教育的師資或開設科技教育的課程。

小學教師的科技課程進修方面，目前在職進修最常見的是配合小學「週三進修時間」於週三下午辦理研習。其中科技教學的相關研習內容例如：透過聘請師範院校教授到校進行相關主題的講演或輔導，或者請主修科技教師的在職教師進行相關經驗的交換與傳授，以達成科技教育知能的進修。至於小學教師若進行更進一步的科技教育碩士學分、碩士學位的進修，通常以台灣師大、高雄師大的工業科技教育系爲主；博士班部份目前僅有台灣師大開設，高雄師大則正籌設中；師範學院目前則尚無相關的系所。

Pre-service and In-service Education of Elementary School Teacher

Teachers in kindergartens are graduates of departments of childhood education of teachers' colleges. No specialized courses of technology are required for prospective kindergarten teachers. Teachers in elementary schools are mainly graduates from other departments of teachers' colleges, who must take some other required credits for multi-subject teaching. For instance, instructional methods of craftwork, keyboard-instrument music, children literature, are required for being a well-rounded teacher.

Technology is not taught as an independent course in elementary schools at present, similarly, technology education programs are not institutionalized in teachers' colleges. Nevertheless, in these colleges, there are some faculty members majoring in Industrial Education or Technology Education, so the prospective teachers still have the opportunity toward technological learning. There are few technological courses in teachers' programs of other universities.

For elementary school teachers, the most common type of in-service training should be the "study time" which regularly takes place on Wednesday afternoons. Advanced studies for technology education usually conducted by arranged lecture or seminar, with professors, or experienced teachers are encouraged. Formal degrees of master/doctorate are also provided at normal universities to these teachers as well as teachers in secondary schools.

在未來展望方面，爲了因應國教九年一貫課程的發展趨勢，「自然與生活科技」課程的推動與實施，實有賴於在小學師資培育機構中開設科技教育相關學系或學程，藉由更周密的師資培育讓科技教育得以紮根於小學階段，並可同時作爲科技教師在職進修中心。

三、 國中及高中教師及其養成和進修

自 1950 年代起，我國即透過完整且正式的管道培育中學工藝教師。直到 1968 年，由於九年國民義務教育的驟然實施，導致國中階段嚴重缺乏合格教師，於是政府開始大量進用具有美術或美工背景的人擔任工藝教師。過去我國中學生活科技師資來源主要由台灣師大及高雄師大工業科技教育系（前身爲工藝教育學系）兩所師資培育機構，每年約招收 100 名經由大學聯考入學的學生，接受爲期四年的在校教育後，分發到學校進行一年的實地教師實習，正式畢業取得合格工藝/生活科技教師資格。這些人員一畢業後，大多數都投入國、高中工藝/生活科技教學行列，此一背景的教師目前佔全國生活科技教師的多數，他們於師資養成階段從早期必須學習金工、木工、電工、電子、塑膠工、資訊電腦、製圖、工藝設計、造型等專門課程與教材教法，到現在以科技系統區分的營建、製造、傳播、運輸等系統的專門課程與教材教法。一般而言，經由兩所師大所培育出的師資，由於受過較完整的師資養成教育，因此具有較好的科技背景知識與學習能力。但美術或美工基礎則有待個人的努力方能比美以前進用的老師，以及具有美術或美工背景的教師。

Prospectively, the developments tend toward reflecting the emergence of the new national curriculum syllabus of Living Technology for grades 1-9. With the view of implementing the new technological literacy education, the need of programs/departments of technology teacher education, preparing elementary school technology teachers, emerges. Furthermore, these institutions can also function as a center of in-service training.

Pre-service and In-service Education of Junior and Senior High School Teacher

Taiwan has a complete and formal system to train Industrial Arts / Living Technology teachers-to-be since 1950's. A shortage of qualified junior-high school teachers followed the sudden extension of compulsory education from six years to nine years in 1968, and many people who specialized in arts and crafts then became Industrial Arts teachers. In the past, the majority of secondary-school Living Technology teachers were graduates of the departments of Industrial Technology (formerly Industrial Arts) of National Taiwan Normal University and National Kaohsiung Normal University. These two departments accept about 100 students who pass the joint entrance examination for colleges and universities every year. The students can earn a B. Ed. degree and become a certificated teacher in industrial Arts/Living Technology after our-years of on-campus training and one-year field internship in secondary schools. Most of them work as junior-high or senior-high school teachers in Industrial Arts/Living Technology after graduation. They are the majority of the teachers in Living Technology in-service. Prospective teachers in the Living Technology/Industrial Arts teacher program in earlier days took specialty courses such as metal working, wood working, electricity, electronics, plastics, information and computer, graphics, design, and modeling, while the prospective teachers nowadays take systematic courses in the following four domains: construction, manufacturing, communication and transportation. Generally speaking, teachers who graduated from the two normal universities receive thorough training in teaching and thus have more technological knowledge and better learning abilities. However, their arts and crafts abilities might be not as good as those senior teachers with the background of arts and crafts unless they initiated some independent development.

爲了因應教師進修需求，台灣師大及高雄師大每年都開辦研究所學位和學分班，提供在職教師進修機會，報考人數相當踴躍。爲了有效協助在職生活科技教師持續發展專業知能，許多大學校院及教師研習機構，也會開辦各種在職專業訓練課程和研習會。爲了加強學術研究與專業發展，國立台灣師範大學並於 1998 年，設立工業科技教育博士班，提供了完整的科技教師進修與學術專業發展的管道。

教育改革的聲浪，帶動了師資培育的變革。1994 年的「師資培育法」，使得師資培育不再是師範校院的專利，所有公、私立的一般大學與學院，只要通過教育部的審核，即可於校內的學院、系所或學程中，進行相關的師資培育。因此，現階段的中學科技教育師資來源，已經在這開放的政策中趨於多元化，師資可能來自不同的相關科技應用、設計等不同的學系，學生的背景專長亦趨於多元化。

一般而言，其我國科技教育師資培育現況具有下列特色：

(一)順應改革聲浪採開放式師資培育

由於社會發展與時代轉變，我國的師資培育制度，由專責培育的傳統體制，轉型爲多元開放的競爭體制，能爲整個教育系統注入了多元化的活力，但專業化能否維持或提昇卻成爲被關注的議題。

Both National Taiwan Normal University and National Kaohsiung Normal University supply graduate-level degree and non-degree programs to in-service teachers to satisfy their need for advanced studies. In 1991, both normal universities started their master's program in Industrial Technology Education. Many in-service teachers and university graduates compete for the opportunities to enroll in the programs every year. Some other authorized universities and teacher professional development centers have been organizing various courses or workshops for in-service teachers. To promote academic research and professional development, National Taiwan Normal University established a doctoral program in Industrial Technology Education in 1998.

Educational reform is a popular topic in Taiwan. It has played a vital role in our education change and innovation. In 1994, the Teacher Preparation Act was revised. From that time, all the universities became eligible to take the responsibility of teacher education. It is no longer solely the responsibility of the normal education system. All the universities and colleges can establish their own teacher education program. Those programs must pass the government verification process. Under this reformative circumstance, normal education system is not the only channel for the teacher preparation education. The teacher education system became a diverse route. In junior- and senior-high school, the living technology teachers may not only graduate from the industrial technology education departments, but can also graduate from other different universities or colleges. The backgrounds of living technology teachers are also diversified.

In general, there are some special features in our technology teacher education as follows:

(二)新師資培育系統尚處於變動中的調適階段

開放的師資培育政策醞釀已久，但正式實施至今只有六年，由於開放改革的幅度甚大，相關的配套法令與措施未臻完備。因此，在這個變動初期，也引發了許多新的挑戰，需要逐一克服。

(三)傳統師範體制正轉型

原先專責培育中學生活科技師資的工業科技教育系，在師資培育多元開放的環境下，也朝向多角經營的方向發展。在轉型發展上，除了提供科技教育師資培育課程外，亦提供科技專精和人力資源發展等課程，培育業界所需人力。

現階段我國科技教育師資培育亦遭遇下列問題，亟待改善：

(一)新的師資培育制度與配合措施未臻完善

由於師資培育制度的巨大變革，對於傳統師範校院帶來衝擊，對於一般大學院校也增添新的發展方向。這些新的變革與發展，一定要事先規劃得宜，才不會產生舊優點消失、新缺點出現的現象。而現行培育制度中，已出現許多缺失，例如：教育專業意願及學科專門品質堪疑、外加式教育實習成本效益不彰、教師檢定制度流於形式等，都是需要努力克服的。

科技教育師資的培育比其他學科更加複雜的。究其教學內涵就比其他學科複雜且變動性高，再究其外圍環境又有許多問題，諸如：升學影響教學正常化、許多人鄙視「百工技藝」課程、教師基本教學時數比其他多數科目多、授課班級人數過大等，這些都是在師資教育改革時，應同時考慮的問題，且如何協助教師們務實發展與接受挑戰，也是非常重要的課題。

1. Fitting the educational reform trend and transforming teacher education policy into an open public vision

Due to social development and the epoch transformation, our teacher education system is still in a transformation stage. Before 1994, it was a patent of the normal education system. However, after 1994, the new Teacher Preparation Act was revised. It played an innovative role. Teacher education system, from a close and conservative system, transformed into an open and competitive system. However, the promotion of teacher professionalism has become a major concern.

2. Teacher education is still in a changing and adaptive stage

The open policy of teacher education was planed over a long period. However, from the new Act's execution date, it was only implemented for six years. The new teacher education system is still in an infancy stage. In this dynamic and changing era, there are many activities and situations which must be modified and operated in a coordination status. Therefore, there are still many obstacles to be overcome.

3. Traditional normal education system is in transformation now

In the open environment, traditional normal universities and colleges have to transfer their responsibility from a single to a multiple goal. The departments of industrial technology education also provide multiple purpose curricula. For instance, they also provided specialized technology and human resource development (HRD) programs to fit the industry and corporation requirements.

Due to the changing environment and transformation era, there are some challenges in technology teacher education that we have to overcome as follows:

1. New teacher education system vs. old educational environment

Due to the dramatic change of the teacher education system, the normal education system was impacted under this circumstance. On the other hand, it also gave rise to other universities and colleges. It brought new vision to those universities. However, these changes also generated many new challenges that need to be resolved.

(二)需要加強在職進修體系

由於教學內涵的快速變遷，使得中小學生活科技教師，需要一個更完善的在職進修制度。它必須能全面關照各層級全體科技教育師資，而且促使教師團隊成爲學習社群，以促成教師們主動學習和相互合作。

由於前人的努力，科技教育及其師資教育在我國的發展，已經有了一些良好的基礎，但面對未來與挑戰，科技教育及其師資教育人員應有更積極的投注，來鞏固和繁榮此一可裨益全民科技素養的專業領域。

Special attention needs to focus on the education environment, and the changing program should be carefully implemented. Unfortunately, there are still many disadvantages in our educational environment, such as the quality assurance of the new teacher education programs, the cost-benefit of the 5th year practical training and the appropriateness of teacher certification that should be resolved as soon as possible.

In secondary school, the issue of technology teacher education is more complicated than other fields. There are still many problems in the realistic school environment, such as teaching abnormal problems, the ignored phenomenon of the practical skill courses, the unequal teaching load on living technology teachers, and the problem having too many students in one class.

2. Emergency issue on in-service training system

Due to rapid changes and environmental transformations, a complete and high quality in-service training system for technology teachers is very important. It must fit the total requirement and generate a continuous training and development environment. Furthermore, establishing a constructive system, promoting teachers' active learning, and exchanging knowledge are the most urgent issues.

Technology education and its technology teacher education have been developing in our country for a long time. Predecessors of technology education have already established many outstanding achievements. In confronting the future challenges, aggressive attitude is the best solution to resolving the future problems.